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Dr. Fullon
M.S.M.

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WHAT IS CIVIL ENGINEERING?

Prof. T. G.MacCarthy.

A very common magazine illustration of a Civil Engineer is an individual, rough and ready in appearance, squinting intently through the telescope of a transit and waving his arms franticly over his head. Another popular conception is a person balanced majestically on top of a partially constructed bridge with a blue print in one hand and pointing with the other seemingly at some uncertain point on the horizon. The observer is left to conclude that Civil Engineering is the pleasant task of looking through transits and pointing at things from a partially constructed bridge and the "like of that." What an entirely different vision is presented when survey notes fail to check, construction goes wrong, design problems become complicated with indeterminate factors, construction materials are unsatisfactory, costs exceed estimates, etc, etc.

Civil Engineering in its broadest meaning includes all branches of engineering as is indicated by the membership of the American Society of Civil Engineers. Formerly Tridgold defined Civil Engineering to include substantially all the applied sciences that relate to construction. On all large construction enterprises, however, several branches of engineering are involved, mechanical, electrical, mining, etc., and today these related branches have reached such a high degree of specialization that it has become a herculean task for any one engineer to apply a complete knowledge of each of these related branches. We see this clearly indicated today by the membership of Civil Engineering consulting firms which include Civil Engineers, Mechanical Engineers, and Electrical Engineers.

To better view the scope of Civil Engineering considered as a branch of engineering we may review briefly the activities of Civil Engineers in the past under the following headings:

Surveying—Accomplishments of Government General Land Office, U. S. Coast and Geodetic Survey, and U. S. Geological Survey. Waterways—

Continued on Page Three.

CIVIL ENGINEER'S ISSUE.

To the Civil Engineers past, present, and future this edition of the Miner is dedicated. We the staff feel not a little anxiety as to how it will be received. We hope it pleases you, it certainly does not please us. Since, however, it is the best under the existing circumstances, accept it and let it pass.

If perchance we have written anything that seems prejudiced to our department, we can only ask forbearance, and remember we are Civil Engineers ourselves.

M. S. M. CHAPTER, AMERICAN SOCIETY CIVIL ENGINEERS.

OKLAHOMA UNIVERSITY GRAPPLERS DEFEAT MINERS.

The Oklahoma Sooners succeeded in making a clean sweep of Thursday night's bouts at Jackling Gym, garnering three falls and four decisions. Lack of experience and physical condition enabled the visitors to triumph.

Captain Moulder was on top when his bout was finished and only a discrepency of two minutes in the timer's watch, causing the bout to be rerun, cost him the decision. His opponent succeeded in gaining the time advantage in the second bout.

Huddled of the Sooners, pinned Cook's shoulder to the mat in the featherweight class, after 8 minutes of tussling.

Hill's Sooner apponent spent most of his time going outside the ring but the visitor managed to stay on top for a decision.

Jennings, of the Miners, time and again wriggled out of a body scissors against Englis, of O. U., in the 145 pound bout, but the visitor held a time advantage at the bell.

Captain Cooke of Oklahoma, proved the visitors speediest grappler by throwing Weiss, of the Miners, in 2 minutes and 22 seconds. Cooke appeared to be the best wrestler of the evening. Bolon, of the Miners, was unable to gain the top in the light-heavy bout and Fullerton took the decision.

Schaffner, Miner heavyweight, secured a number of punishing headlocks on Will, of the Sooners, but was forced to succumb after being thrown to the floor from a standing position.

Summary:

115 pound class—Lewis (O. U.) won by 3 min. 40 sec. time advantage against Capt. Moulder (Miners).

MINER BASKETEERS DROP CLOSE GAME TO DRURY.

The Miners carved another notch in the hard-luck championship last Saturday night by dropping a 30 to 27 game to the Drurry Panthers. The Dennie five swept thru the visitors' defense without much trouble, but failed to put the leather thru the net on their scoring chances.

The Pantthers got away to a long lead in the first ten minutes, with the tally 13 to 3, but the Miners closed the margin some before half time. The Panthers had the best end of a 17 to 10 score when the initial stanza ended, with De La Porte doing the most damage in scoring.

The Miners began a strong attack in the second half, and brought the count to 18 to 16. The Dennie five were bringing the ball thru the Drury defense effectively, but the ball persistently dropped on the wrong side of the ring. With four minutes to go Ray and Tucker counted field goals, making the count 29 to 27 in the visitors' favor. The Miners missed a couple of setups, and the game was entered in the loss column, 30 to 27, at the final gun.

Poor shooting cost the game, since the Miners' passing, time and again penetrated the Panther defense for no score. Neidermeyer, Thomas and Tucker scored twenty-two of the Miner tallies.

De La Porte proved not so dangerous in the second stanza, but his accurate tosses in the first half gave him a total of ten points, with Neale of the Panthers counting nine.

Line-up:

Miners (27)		Drury (30)
Tucker (7)	r f	Neale (9
Tucker (7)	r f	Neale (9)
Thomas (7)	l f	Robberson (1)
Neidermeyer (8)	c	De La Porte (10)
Ray (3)	r g	Mitchell (5)
Miller	l g	(c) Mayden (2)

Score at end of first half: Drury 17. Miners 10.

Substitutions: Miners, Hollow (2) and Tamm. Drury, Mason (3).

Referee, Orr.

125 pound class—Huddle (O. U.) won by fall in 8 min. 17 sec. against Cook (Miners).

135 pound class—Danforth (O. U.) won by 7 min. 33 sec. time advantage against Hill (Miners).

145 pound class—Englis (O. U.) won by 8 min. 55 sec. time advantage against Jennings (Miners).

158 pound class—Cook (O. U.) won by fall in 2 min 22 sec. against Weiss (Miners).

175 pound class—Fullerton (O. U.) won by 8 min. 56 sec. time advantage against Bolon (Miners).

Heavyweight class—Will (O. U.) won by fall against Schaffner (Miners).

Referee—Cook.

KEMPER WRESTLERS DOWN MINERS 16-11.

The Miner grabblers lost a hard fought meet to the Kemper Military Academy netmen in the first contest of the year last Monday at Boonville. Cook scored a fall in the featherweight division, and Captain Moulder and Schaffner took the decisions in the bantam and heavyweight bouts to total eleven points for the Miners. The cadets won four bouts, two by falls and two by decisions.

Summary:

115 pound class—Capt. Moulder (Miners) won by 2 min. 5 sec. time advantage against McConnell (Kemper).

125 pound class—Cook (Miners) threw Goldman (Kemper) in 4 min.

135 pound class—Hill (Miners) lost to Long (Kemper) by 1 min. 58 sec. time advantage.

145 pound class—Livingston (Miners) lost to Capt. Thompson (Kemper) by 8 min. time advantage.

158 pound class—Weiss (Miners was thrown by Sutphen (Kemper) in 4 min. 10 sec.

175 pound class—Bolon (Miners) was thrown by Winberg (Kemper) in 4 min. 35 sec.

Heavyweight class: Schaffner (Miners) won by 3 min. 18 sec. time advantage against McCaleb (Kemper).

Referee—W. D. Semple, Washington U.

MINER MATMEN MEET MISSOURI U. NEXT SATURDAY.

The Miner wrestling squad will meet the Missouri University grapplers in the final meet of the year at Columbia next Saturday. The Tiger headlock artists have met defeat at the hands of the Nebraska and Kansas U. squad so far this season. The Columbians also meet Oklahoma U. this Saturday, February 19. Last years bouts were close and well contested with the Tigers, having a bare 14-11 advantage at the end of the bouts.

INTRAMURAL B. B. LEAGUE. SERIES STANDING.

	W.	L.	P.Ct.
Independents	6	1	857
Kappa Sigma	6	1	857
Sigma Nu	5	2	714
Lambda Chi Alpha	5	3	625
Mercier	4	4	500
Bonanza	3	4	428
Pi Kappa Alpha	1	5	167
Prospectors	1	5	167
Kappa Alpha	1	6	143

Results.

Bonanza 39, Grubstakers 9.

Lambda Chi Alpha 16, Independents 15.

Mercier 14, Kappa Alpha 6.

Sigma Nu 20, Prospectors 12.

Last Wednesday night the Springfield Bears took the Miner five into camp by a 49 to23 score at Springfield. Ineffective shooting by the Miners lost numerous scoring opportunities, while the home team hit the net with disastrous regularity.

The Bears started off with a rush and counted eleven points before the Miner quintet succeeded in locating the basket. A basket and a foul by Neidermeyer and a two-pointer by Ray totaled the Miners' scoring ability in the first twenty minutes, which ended 16 to 5 in the home team's favor.

Ray started the scoring in the second half with a long arnge shot, but the Bears got under way and counted thirty-three points in the last half.

Neidermeyer, Thomas and Ray did all of the scoring for the Golden Jerseyed five. Neidermeyer tallied thirteen points for the Miners, tying Fox and Stark of the Bears for high-scoring honors.

Line-up:

Miners (23)		Springfield (49)
Tucker	r f	(c) Fox (13)
Thomas (6)	l f	Stark (13)
Neidermeyer (13)	c	Wright (9)
Ray (4)	r g	Dodd (3)
Miller	l g	Tindall (2)

Score at end of first half: Springfield 16, Miners 5.

Substitutions: Miners, Hollow and Tamm. Springfield, Fredericks, Taylar (2), George (2), Thomas (5), Cain and Jones.

Referee—L. Davis.

DRURY AND SPRINGFIELD OPPOSE MINERS THIS WEEK.

Coach Dennie's basketeers will invade the Panther jungle at Springfield this Thursday in an attempt to turn tables on the Drury five.

The Springfield Bears will be in Rolla next Saturday for the final contest of the year. The Bears defeated the Miner representatives last week at Springfield, but if the golden jerseyed dribblers come out of their shooting slump the unexpected may happen.

CIVIL ENGINEERING EQUIPMENT.

The department is equipped for field work with twenty-four transits, five of which are complete mining instruments with side and top telescopes; and twenty-nine Wye and Dumpy levels, representing the principal makes and types of construction. Additional surveyor's compass, three geologist's compasses, four Brunton transits, twelve plane-tables, two sextents, and a liberal supply of hand levels, barometers, clinometers, dip-needles, angle prisms, chains, tapes, level rods, stadia rods, range poles, etc. (A Saegmuller) or Solar attachment and a Burt Solar attachment has been added this fall for the use in astronomical observation and a four inch telescope is being added. This equipment is valued at over $50,000.

TICKETS ON SALE FOR THE COFFER-MILLER PLAYERS.

Tickets for the Coffer-Miller Players will be put on sale this week. Only six hundred tickets will be sold. The price will be $1.25 per ticket and the ticket will admitt one person to two plays. The Players will give "The Rivals" on March 10 and "The Imaginary Invalid" on March 11. The tickets will be sold by members of the Junior Class. Have the money ready and buy your ticket before it is too late.

Our Miners' Band has been out in "droppy" force recently at the basketball games. This is a good thing. We are glad to hear them. This organization has held together well this year, and has been a real help to the school at practically no cost. It is strictly a student affair, and should have the encouragement of every one on the campus who is interested in school activities. Their rehearsals are held on Tuesday night of each week now instead of Wednesday.

Continued from Page One.

Construction of Erie Canal, improvement of rivers and harbors, and construction of the Panama Canal. Highways—Recent State and County Highway construction programs. Railways—The network of our railway system is a very evident accomplishment in this line of endeavor. Power—Water power projects for development of electrical energy. Bridge Building—Numerous reinforced concrete and steel bridges, railroads and highways. City Planning—Recent planning of large cities for future growth of public works, utilities, traffic, buildings, parks, etc. Tunneling—Built in interest of transportation on highway or railroads. The Vehicular Tunnel under the Hudson River, the Moffat Tunnel and the subways in New York and Philadelphia are notable examples. Water Supply—More than 10,000 cities and towns in the United States have public water supply systems. The Catskill, New York Water Supply and many others are excellent examples. Sewage and Sewage Disposal—The handling of the waste products in such cities as Chicago, New York, St. Louis, and Philadelphia and many interior cities attest to achievements along this line. Structural Engineering—The many skyscraper office buildings in some cases fifty stories in height and the numerous industrial plants utilizing structural steel and reinforced concrete cover this field of Civil Engineering. Irrigation—The reclamation of some 2,000,000 acres of swamp land by the U. S. Reclamation Survey and the creation of some 20,000,000 acres of arid region into fertile farm lands is illustrative of this field of work.

The above illustrates the scope of Civil Engineering as practiced today. The training of a college student in Civil Engineering should fit him to enter any of the above fields not with a complete knowledge of any one of the divisions, but sufficiently acquainted with the fundamentals of each so that by further study and actual experience he may become known as a Civil Engineer.

The term Civil Engineer applies to all engineers engaged in the above enumerated branches of Civil Engineering but of recent date due to the extreme specialization of engineering practice a Civil Engineer is classified in accordance with the branch of Civil Engineering he is engaged in as follows:

Railroad Engineer—Engaged in location, construction, maintenance, and management of operation of railroads. Highway Engineer—Engaged in location, construction, maintenance, and testing of materials of highways. Sanitary Engineer—Engaged in design and construction of municipal water supply and sewage systems with special training in the bacteriology of water born diseases and the engineering methods of guarding against these diseases in water supply systems. Structural Engineer—Engaged in design and construction of steel and reinforced concrete structures such as office buildings, industrial plants, and bridges. Hydraulic Engineer—Engaged in irrigation and drainage projects, design and construction of water power and waterway improvements projects. City Planning Engineer—Engaged in planning for future municipal growth of public utilities, traffic, buildings, parks, etc., so as to direct the growth of cities to the best advantage of health, beauty, and convenience. Sales Engineer—Engaged in selling engineering materials to engineers as purchasers and as specifyers of what material shall be used.

The above branches of Civil Engineering practice overlap quite frequently. For instance a City Engineer is confronted with problems in all of the above branches but in large cities the actual design and construction of any project is done by one of the above engineer specialists (Consulting Engineer).

For an intelligent practice of all of the above branches of Civil Engineering a thorough knowledge of the follow fundamental subjects is essential:

Surveying, Drafting, Testing of Construction Materials, Reinforced Concrete Design, Hydraulic, Elements of Electrical Engineering, Elements of Mechanical Engineering.

This of course presupposes a thorough working knowledge of the pure sciences upon which the above applied sciences are based, such as: Mathematics, Chemistry, Physics, Mechanics, Geology,

The work of the Civil Engineer requires a knowledge of the pure sciences and the application of this knowledge. There are some that contend that to be practical one must not be theoretical and conversely there are those who maintain that to be scientific one must be practical. Both fail to appreciate that the engineer must be both scientific and practical (not in the extreme in either case) to be capable of practically applying scientific knowledge.

An Engineer who only knows "how" to do what he is directed to do, but does not know "why" they are done so, usually remains a subordinate. The converse is equally true if not worse for the former is at least a useful person.

It might be informative to list the titles of several engineers as taken at random from the membership catalog of the American Society of Civil Engineers as here below:

Designer, Construction Engineer, Superintendent of Construction, Hydraulic Engineer, District Engineer, Great Northern Railroad, Manager Walworth International Co. Senior Highway Engineer, Vice-President & Executive Engineer. Architect. Sales Engineer, Consulting Engineer. City Engineer.

In the past it has been customary to limit engineering instruction to the applied scientific study of design and construction only. As a result the engineering student upon graduation found that he had to undergo a considerable mental readjustment to fully grasp the cut throat subordination of recommended design and construction practices to the all powerful influence of "how much will it cost?" Many today are unwilling to appreciate that engineering "practice" must conform to commercial conditions and requirements.

The Civil Engineer must be capable of following up the detail records of construction and operation costs and keeping same in proper form if he is ever to rise to a position of responsibility. Keeping of such records is entirely outside of the realm of the accountant. Allied with the keeping of cost data is the very common task of the engineer namely to estimate probable cost of a proposed structure.

Many financial disasters in the past particularly among our railroads where the Civil Engineer exerted considerable influence might have been avoided if a combination of engineering knowledge and principles of business had been exercised to prevent the impairment of invested capital by the payment of unearned dividends.

The addition of courses in business principles to the technical curricula therefore in the writer's opinion

enhances the chances of developing an all-round man—an Engineer—both practical and scientific with a broad point of view and capable of looking at his work from all points of view, from that of his client—the investor, and from that of the contractor—who is erecting the structure. The experienced Civil Engineer has recently more than ever before become the medium between the investor and the construction so that the ultimate goal should, in the writer's opinion, be executive in character. This would necessitate a gradual withdrawal after sufficient years of engineering experience from pure technical detail of engineering as he assumes greater responsibilities for the business success of engineering enterprises.

PROFESSOR HARRIS.

Professor Harris was born at Spartanburg, South Carolina, June 27, 1861. In 1882 he graduated in Civil Engineering from the University of Virginia. Following his graduation he followed professional work in South Carolina, Mississippi, Arkansas, Texas and Indiana Territory.

He become professor of Civil Engineering, and Director of The Missouri School of Mines in 1892, resigning the directorship one year later to devote his entire time to the Department of Civil Engineering. Except for a period in 1901-03, when he was Associate Professor of Civil Engineering at Pennsylvania University, he has been head of the Department here.

Professor Harris has gained nation wide reputation as an Engineer through his numerous publications. He is the inventor of the Return Air Pumping System, and the author of a text-book on Compressed Air. He has published several bulletins bearing on Friction in air pipes, on flow of air through large orfices, on road problems in the Ozarks, and a study on reinforced concrete dams. Some of his other articles published in technical journals are as follows: "Centrifugal Pumps and Fans," "Theory of Return-Air Pumps," "Silting of Streams," "Charts for Solution of Mannings Formula," and several other minor articles.

Professor Harris deserves the esteem and respect of the student body of M. S. M., for although he is a stern advocate of the principle that: The student should peruse the text, his courses are thorough and practical and consequently "worth while."

Professor Harris' office door is always open to the student, who may seek advice and he has helped many of us over rough spots in our college career. He stands ready at all times to do what he can to make things worth while.

LATEST RECOMMENDATIONS OF THE JOINT COMMITTEE ON STANDARD SPECIFICATIONS.

Compiled by Prof. H. Thrust and Prof. V. Shear.

The Analysis of Eccentric Loadings on a Collegiate Flivver and its Ratio to the Gasoline Consumption.

General Assumption—(a) Loads—forces to be resisted are those due to:

1. The dead load—weight of machine itself plus the dead load (driver and companions).

2. The live loads—the dynamic effect of the live load, wind pressures, and the variable load due to temperature stresses caused by the amount of heat generated by engine and driver.

(b) Length of axle and distance from ground.

1. Unsupported length of rear axle varies directly as the condition of tires and the concentrated load at the center of gravity of the back seat. Unsupported length of front axle varies directly as the size of holes in radiator plus shimmy in front wheels.

(c) Radius of gyration depends upon the number of occupants, potency of the brew and the plastic condition of the soil.

(d) All bending moments depend upon the distance from Dennie's and varies inversely as the square.

(e) The moment of inertia varies as the amount and character of precipitation, the temperature, and the barometric pressure.

(f) The neutral axis depends upon the temperature of blood pressure of the driver.

Taking into account the recommendation suggested by the Joint Committee an empirical formula can be computed which is as follows: G. C = (x plus 3.47) A by - 2 (4 - bcx).

This will give a constant, which, when multiplied by the formula concerning the flow of oil thru pipes and added to the consumption of brew by the driver gives the ratio.

Patronize our Advertisers.

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Issued Every Monday.

Not many years ago the birthday of a great nation was celebrated at Philadelphia. It was fitting that while there, members of the American Society of Civil Engineers should inquire what part of the Civil Engineer had played in the creation of this great nation. We are using the term "civil engineer" in its broadest sense, in order to include all those who through scientific processes are directing the great sources of power in Nature that they may be most useful to mankind.

This does not mean that to the engineer alone belongs all the credit for the colossal advances we now enjoy as a people. His efforts have been involved with those of the artisan, the industrial manager, the inventor, the capitalists, the statesman, and many others; but it is his ability to design as well as to direct engineering works that must be relied on to bring successful results not only out of his own vision but out of the vision of others, and to cause the dreams of man to come true.

The inhabitants of the thirteen States had left their native lands either in search of adventure or to escape conditions that were intolerable. Even had they possessed the knowledge of the arts and sciences as of their day and of the place from whence they came, their new surroundings offered no encouragement to make use of such knowledge. Their existence resembled camp life, with little idea when they would move and where next they would go. Temporary expediency answered every purpose. Their ambitions were confined to securing for themselves food, shelter, and clothing. It might be remarked that one of these was the production of iron, which was smelted with charcoal as fuel. Commerce sought the sea. Inland transportation either by land or water was inconsiderable. It was not until 1830 that the steam railroad came, and even twenty years later that great agent of civilization had scarcely begun to play its part. Turning, then, to the object of our inquiry, namely, what has the civil engineer accomplished, we shall find his greatest triumphs within the past seventy-five years.

It was in 1824 that the first civil engineering school in America was opened. The founder of this school was Stephen Van Rensselaer. His contact with the problems of that time had given him a vision of the influence that the technical mind would have over the future affairs of the people. At that time transportation was—as it has continued to be—the great problem underlying the prosperity of the nation. Then it dwelt with sailing vessels and horse-drawn vehicles. Later, the highway yielded to the canal, then the canal to the railway, and now the railway is viewing with alarm the return of the highway to public favor. The beast of burden has all but disappeared, and human energy has been replaced with mechanical power from Nature's great storehouse. That public service may be brought to the home, the switch, the valve, the spigot have been installed. That worthless land may be redeemed, irrigation and drainage have been effected. That the worker may be comfortably sheltered and profitably employed, the skyscraper and the industrial plant have been built. That commerce may move whither it will, the face of Nature has been smoothed with bridge and tunnel.

The Civil Engineer deals with quantity, time, cause, and effect. His problems involve dimensions, form, and motion. He creates today and destroys tomorrow, but out of the destruction new forms arise of improved design and greater utility. Experience may be a guide for his future policy, but he cannot rest on repetitions of methods that may have brought him fame. He must be alert to the ever changing conditions about him, recognize the problems they create, and apply wisdom and ingenuity to their solution.

He accepts physical laws as immutable. In the past one hundred and fifty years he has developed no new ones, but he has subjected the familiar ones to a more searching analysis. New forms of fuel have been found; the steam engine has been developed; electricity born; and the key to distribution of power found. Less drudgery, better health, and more leisure—these are the realities of the American life today to which the Civil Engineer has contributed.

HISTORIC NOTES AND COMMENTS RELATING TO THE CIVIL ENGINEERING DEPARTMENT IN M. S. M.

These notes will be confined strictly to the subject, for some side lights are essential for the reader to get a correct perspective of what has transpired and why.

The Missouri School of Mines and Metallurgy was formally opened and started on its course Nov. 23, 1871. In the university catalog of dates 1870 ot 1873 appears the following—"though just closing its second year (t) has had most encouraging success—. It is a School of Technology with Civil and Mining Engineering and Metallurgy as specialties." Following this is a statement about the full and excellent equipment. As a matter of fact at that date the School of Mines—all departments, laboratories and museums—was housed in the present State Geological Survey Building. There are men yet living who saw the entire chemical laboratory confined to a partition about 15 by 30 feet in the south end of the east room—first floor—of the Ge-

ology Building. Other laboratories and equipment were of the same order of excellence.

As late as 1891 the surveying equipment consisted of one sextant, one surveyor's compass, one Burt solar compass, one Gurley level and one Young's transit. Those who knew said they were salvaged from the Ark.

At that date (1873) the faculty consisted of Charles P. Williams, Director and Professor of Analytic Chemistry and Metallurgy; James W. Abert, Professor of Civil Engineering and Drawing; one professor of "Pure" Mathematics; one of Geology and Natural History; one instructor in "English Branches" and one "Lecturer" in Anatomy, Physiology and Hygiene. Of students there were registerd 75 of which 50 were from Rolla.

Under date 1875 appears in the report of an examining committee of the Legislature, on Mines and Mining, a page of eulogy of the School of Mines with a comment that—"the School thereby becoming the recipient of $10,000 for the years 1875 and 1876"—$5,000 a year. It is evident by the context that the writer of tha record considered that a very liberal appropriation.

In 1888, while a drug-clerk at Jefferson City, Professor Dean became acquainted with Gov. Jno. D. Marmaduke. When the bill for an appropriation of $15,000 for the School of Mines came up, he asked the Governor why such a small appropriation was made. The Governor replied that he had recommended $10,000 but could not get the assembly to pass it. He said that some day the Missouri School of Mines would be one of the greatet technical schools in the world.

By the preceding notes we now can better appreciate the wisdom of the admonition "Despise not the days of small things".

It is of interest to note some changes in engineering practice. Back in the eighties there was not such a plethora of subjects and text books as now, to worry the schedule makers; the trouble was rather to find subjects to fill the time. So there appears in these old schedules four terms of chemistry and in one term three subjects in chemistry. In drawing—five terms—in one term two subjects viz. shades, shadows and perspective and mechanical drawing, in another term two subjects viz. stone cutting (stereotomy) and mechanical drawing. Roads and Railroads are but as one subject. Of hydraulics there is no mention but there appears three terms of Civil Engineering Lectures. Three terms of Civil Engineering Lectures without a text book!

Not many years passed before the "Preparatory" courses (little more than high school work) were dropped and the full four years of university work established; Shades, Shadows, and Perspective faded out; Stereotomy gave way to Masonry Construction; some chemistry gave place to Hydraulics; some more chemistry or geology went out to give place to Reinforced Concrete (about which nothing had been put into text books previous to about 1904) and about the last important addition to the course was Engineering Economics. In all the years debate on what should come in and what should go out and how time should be allotted was continuous, and will on through the years.

Professor Wait was a chemist and during his administration the course ran rather too much into chemistry, so much so that it came to the attention of the Board fo Curators and a resolution was recorded that thereafter the duties of Director should fall on the Professor of Civil Engineering. Hence to Professor Echols and afterward to Professor Harris was assigned the duties of Director in addition to what would now be considered a very heavy teaching schedule. After two years of experience as director Professor Harris dropped the "hot poker" and has stood by and seen seven others do likewise.

During the first twenty years the school graduated two to four men a year. These were nearly equally divided between Mining and Civil. In the latter eighties there was a slump in attendance and only one graduated in three years. That one was that loyal old friend to the school "Prof. Dean." His loyalty was such that he allowed himself to be graduated two years in succession. Thus helping to save the face of the school and who knows but that he may have saved its life, for those were the times in which there was a perennial effort to move the school.

At this crucial time in the history of the school Professor Echols took charge, and from that time on the curve of attendance equipment, expansion of studies and enlargement of faculty has shown a continuous up turn, except for a little dip during the great war. The increased attendance and number of graduates is apparent in all branches of the School. Subsequent to the war there is a noticable up turn in registration in Civil Engineering. This is due to two causes: first, the great demand for, and creditable achievements of civil engineers during the war, and perhaps the fact they were immune from the trenches; second, the coming of the automobile and several other less conspicuous causes. The auto has run over the civil engineer. He can not build fast enough to keep out of its way.

This brings to mind an editorial in Engineering News of about twenty years ago in which was cited the great and increasing number of graduates in Civil Engineering, and the prediction made that the demand could not keep up with the supply. The Engineering News is always conservative. No man living at that time prophesied the whirl wind of development that was coming.

As for the careers of C. E. graduates of M. S. M. that would fill many books.

FUTURE OF CIVIL ENGINEERING AT M. S. M.

Not many years ago the graduates of M. S. M. who were not Mining Engineers were few and far between. In fact sixty percent were Miners and the remaining forty percent were distributed among the six other branches of engineering taught here.

Now, however, things are different—the Miners have about 35 percent, the Civils about 35 per cent, and the remaining 30 per cent is divided among the other five classes. This is a large increase and has gradually taken place in the last six years, the number increasing from year to year.

It won't be so many more years now that the school will be known not only for its Miners but for its Civils as well. And some time in the near future the campus of M. S. M. will be graced by a large, imposing building where the Civil Engineers are wont to gather and to claim as their own.

The C. E.'s have only one regret on leaving school. They have never heard first hand, about Dr. Dake's thiryt-four mile overthrust.

Prof. Bardsley, after a great deal of research work on highway curves, has come to the conclusion that the most dangerous curves on highways are those sitting next to you.

Famous sayings heard six times a week in C. E. classes:

E. G. H.—"The student must observe closely".

J. B. B.—"If you have had slipstick—".

T. G. M.—"I don't follow you, Mr.—".

C. E. B.—"When I was at Michigan—".

During Water Supply last semester this problem caused a great deal of worry: If you had a concrete reservoir, 300 feet in diameter under a head of 8 feet of beer, what depth of foam would be formed at the surface? Use the formula "v" and the buoyancy formula, B equals W times the volume displaced.

Coming events cast shadows—

The further study of curves at the Art Institute in Chicago.

Milwaukee the oasis in the desert.

Another type problem—what internal pressure will a girl withstand, when a six foot man has both arms around her? Hint—use cylinder formula.

SCOTT "SOUNDS OFF."

John W. Scott, ex-'89, local druggist and bookseller, gave an instructive illustrated talk on "The Harmonic Series and Development of Our Musical Scale" last Monday before the class in General Science in connection with their study of sound. At the conclusion of his talk Mr. Scott, who is director of our Miners' Band, gave it as his opinion that future generations will read music from one "standardized" or uniform clef notation, instead of using four different kinds, as is the case at present.

Recently there appeared at the Capitol of our State a group of citizenry from our leading cities. The purpose of their visit was to urge the passage of certain bills alleged to put into effect economy in our public expenditures. One of the members of this group inadvertently mentioned something about copper-lined stomachs. May not we suggest that the group take a few courses in chemistry and metallurgy in order that their terminology may be a bit more exact?

J. F. (Jake) Helmerichs has resigned his position with the Otis Bros. Company at Providence, Rhode Island, and at present is located in St. Louis.

Mr. and Mrs. Huston F. Taylor, '21, are entertaining a son at their home in Keokuk, Iowa, born Feb. 1, 1927.

Thompson Alexander, '01, died November 2, 1926. He had been Division Engineer, St. Louis & San Francisco R. R., Fort Smith, Arkansas for some time. For some time prior to his death he had been in Corpus Christi for his health, but died at Alexandria, La., while en route home.

THE COFFER-MILLER PLAYERS.

Everyone is asking "Who are the Coffer-Miller Players?" "Can they put on a good show?" "Will I get my money's worth if I go?" and other questions of the same sort. One way to answer these questions is to know the opinion of those who have heard them.

"I had the opportunity to see the Coffer-Miller players perform one time and was very much pleased with their presentation. It was time and money well spent. They are experienced players and are quite widely known—having presented various productions in many different colleges and universities of America."

—E. C. HUNZE.

"I have seen the Coffer-Miller Players for the past three seasons and want to say that they are real artists. The play, "The Rivals" is a scream and "The Imaginary Invalid" is equally as good."—PAUL WEBER.

"Having seen the Coffer-Miller Players, I can say that there is a real treat in store for all who will take advantage of the opportunity. Real good, clean comedy is their line, and "The Rivals" their specialty. This one play has been presented by them in one place three consecutive years, with a big attendance each year. Any one who misses this is certainly talking himself out of some of the best entertainment ever given."

—J. MAPLE WILSON.

"Having witnessed three or four productions by the Coffer-Miller Players, I am glad to recommend them as very pleasing entertainers and consider their plays extremely enjoyable."—R. S. DOUGLASS, Jr.

"I have seen the Coffer-Miller Players in several of their plays, and can recommend them as clean cut and wholesome entertainments. I feel that any one having the opportunity to see these players should take advantage of it."

—PAUL BERRY.

"I have seen the Coffer-Miller Players give six plays, including 'The Rivals' and 'The Imaginary Invalid', and have enjoyed every one of them. We are extremely fortunate in a small school like M. S. M. to have the opportunity of hearing such high grade artists at so reasonable a price." —L. E. WOODMAN.

THETA TAU OPEN MEETING.

Tuesday evening, February 15, Theta Tau held an open meeting in the Mining Building. The speaker of the evening was Mr. H. M. Lawrence, of the Bureau of Mines, who gave an account of his experience in Alaska.

Opening with a brief historical account of the country, Mr. Lawrence then described some important events in the development of the region. It was highly interesting to hear the descriptions of the obstacles, both political and those of nature, which had to be overcome in order to build the railroads and open up the mines in the interior of the country.

NEW YORK ALUMNI MEETING.

On Monday, February 14th, the New York alumni had a banquet at the Hotel Belmont. Dr. H. T. Mann was toastmaster. Short talks were made by Dr. Fulton, Rowland Cox, Joe Wilson and Chas. Y. Clayton. Those present were Dr. C. H. Fulton, Dr. H. T. Mann, '08; H. A. Grune '04; D. C. Cale, ex-'02; W. M. Weigel '00; Joe Wilson, '21; James Crawford, '26; E. S. Tompkins, ex-'16; M. J. Kelly, '14; R. S. Dean, '15; J. L. Gregg, '23; A. H. Fay, '02; Rowland Cox, '11; H. J. Teas, '17; F. R. Koeberlin, '01.

MUNICIPAL HIGHWAY TRAFFIC ENGINEERING.

By C. E. Bardsley, Assistant Professor of Civil Engineering.

It was not until about the year 1900 that our Highways commenced to be used to any great extent by very rapidly moving vehicles. During the age of progression, in which we now live millions of cars are driven at a high rate of speed. The verage is 35 miles per hour, while the maximum is 75 miles per hour. With this great increase in the use of motor vehicles the necessity for traffic regulations is growing more apparent.

Traffic is one of the principal unsolved problems now before municipalities. The cost of neglecting the traffic problem so far exceeds the cost of correcting it that no municipality can long delay giving the matter proper attention.

Traffic Engineering is simply the application of those fundamental principles of engineering to traffic which bring organization and efficient movement out of disorder. Traffic Engineering, by a study of each specific problem, reduces the number of accidents and promotes the even flow of street traffic.

One of the fundamental principles of Traffic Engineering is that, "when traffic intersects at right angles, there is no confusion."

The early idea of traffic control in cities was to reduce the speed of traffic, but now the reverse is in order—speed it up.

At street intersections, one of three things must be done, (1) let the traffic rotate about a circle in which no lane crosses the other, (2) stop one line of traffic while the other crosses, (3) or we must have grade separation at intersections, as some cities are solving the problem.

From every standpoint traffic is an administration and not a departmental problem. Its treatment calls for the coordinated activity of almost all municipal departments. The traffic problem is too complex to be solved by a few formulas or generalizations based on half information.

Extensive investigations are in order, the traffic census, the parking problem, by—passing through traffic, etc. Street markings, automatic stop and go signs, boulevard stops, and police regulation all help in regulation of the movement of vehicular and pedestrian traffic.

One way streests, the separation of pleasure and commercial traffic are some other phases of the solution of the problem.

Rail traffic and vehicular traffic do not mix well. This point has not as yet been alleviated, the elevated and subway are solutions, but the latter may incur an expense of $80,000,000 per mile. The motor bus has helped the traffic situation in reducing the number of pleasure cars in congested areas.

It can be shown that per individual in a pleasure car that he occupies 17 square feet of street space and while in a street car or motor bus only about 3 square feet.

Every community should have a complete up-to-date record of volume of traffic on its streets, and the circumstances of all highway accidents. Such scientific knowledge is essential in determining improvements. Streets should be modernized to meet current needs. Dead end streets, grade crossings, especially in cities, draw bridges, narrow bridges, and other "bottle necks" which obstruct traffic should be removed. Streets must be improved for present and future needs.

Traffic Engineering offers an up-to-date remunerative field for the keenly alert civil engineer in utilizing his ingenuity in the solution of traffic problems, in design, city planning, structures, legislation, salesmanship, and education.

C. E. course number 112 discusses the problem of the traffic engineer.

THE OBSERVER

The Miner has from time to time announced that its purpose is to promote the general welfare of our scholastic community. With the approaching spring, and the attendant golf season, we feel called upon to issue a warning to everybody concerned. In one of our contemporary dailies, the tragic news was heralded that two individuals had debased and demoralized the ancient and honorable game of golf by staging a duel at fifty yards with golf clubs and balls. If certain notable Scottish members of the community were to resort to this seemingly novel method of settling personal differences, we shudder to think of the result. For the benefit of those interested we would like to call attention to the revised statutes of Missouri under Sections 3463 and 3460, which provide suitable punishment for so engaging.